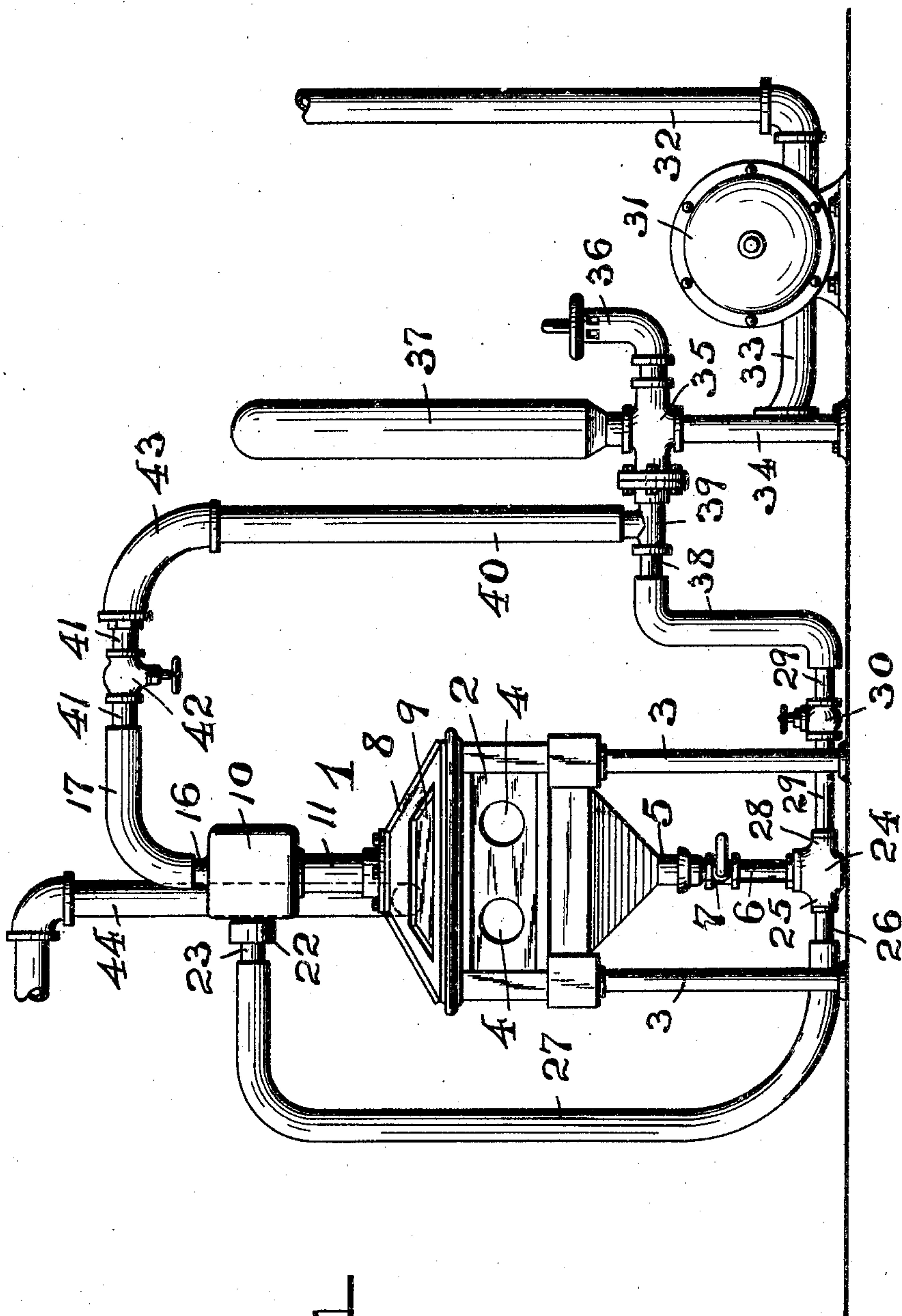


No. 794,507.

PATENTED JULY 11, 1905.

W. R. KING.
SAND BLAST APPARATUS.
APPLICATION FILED OCT. 30, 1903.

2 SHEETS—SHEET 1.



WITNESSES:

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49-1

INVENTOR:

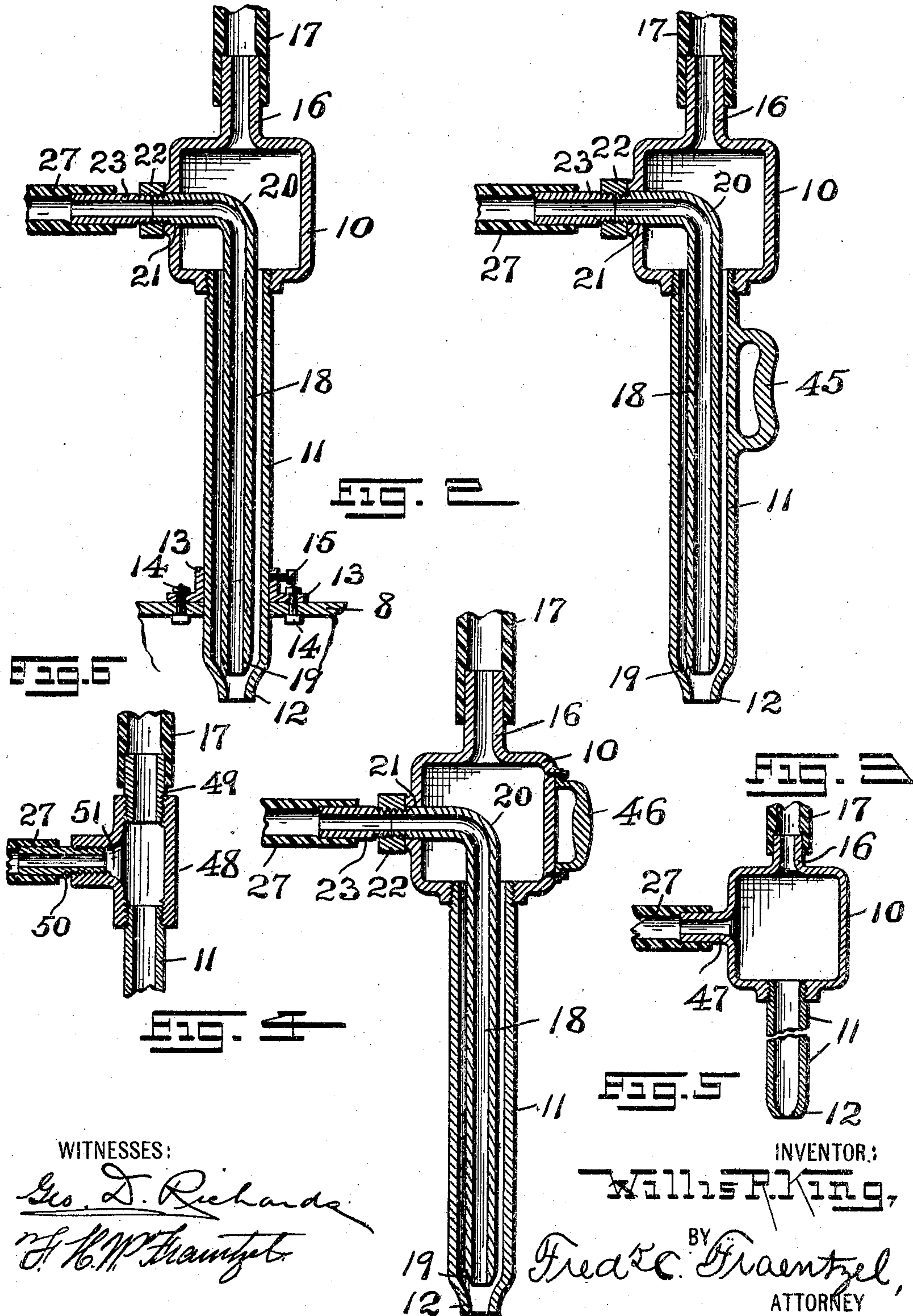
Willis R. King,
BY
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WITNESSES:

Geo. D. Richards
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UNITED STATES PATENT OFFICE.

WILLIS R. KING, OF NEW YORK, N. Y., ASSIGNOR TO THE HANSON & VAN WINKLE COMPANY, A CORPORATION OF NEW JERSEY.

SAND-BLAST APPARATUS.

SPECIFICATION forming part of Letters Patent No. 794,507, dated July 11, 1905.

Original application filed May 21, 1903, Serial No. 158,093. Divided and this application filed October 30, 1903. Serial No. 179,124.

To all whom it may concern:

Be it known that I, WILLIS R. KING, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sand-Blast Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

This invention relates to improvements in sand-blast machines; and the invention is in the nature of a division of my previous application, Serial No. 158,093, filed May 21, 1903.

The present invention has for its primary objects to provide a novel arrangement of devices—one device for conveying an abrading material and another device for conducting a jet of air or other forcing medium to the said abrading material, causing an admixture of the said abrading material and the forcing medium, and, under pressure, accelerating the movements of the particles of the abrading material, either in a single stream or otherwise, upon the surface which is to be treated, and thereby greatly facilitating the operations of surfacing with a greatly-reduced quantity of sand or other abrading material employed.

The invention consists, therefore, in the novel sand-blast apparatus hereinafter set forth and in a means for producing a commingled relation or admixture of the abrading material with a blast of air or other suitable forcing medium, all arranged and constructed to produce an accelerated movement of the abrading material against and upon the surface which is to be treated.

The invention consists, furthermore, in the various arrangements and combinations of parts, all of which will be hereinafter more fully set forth and then finally embodied in the clauses of the claim, which form a part of and are appended to the following specification.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of one form of sand-blast apparatus and devices or mechanism connected therewith, all embodying the principles of the present invention and constructed to produce an accelerated movement of the abrading material from a discharge-opening upon the surface of an object which is to be treated. Fig. 2 is a transverse vertical section, on an enlarged scale, of one arrangement of devices for producing the commingling of an abrading material with an air-blast or other forcing medium to produce an accelerated motion of the abrading material from the discharge opening or outlet of the device. Figs. 3 and 4 are similar sectional representations of the devices illustrated in said Fig. 2, but the devices being provided with variously-arranged holding or lifting means to provide portable devices which may be carried from place to place and may be conveniently used in a room upon very large pieces of work. Figs. 5 and 6 are sectional representations of other modified forms of devices in which the commingling of the abrading material and forcing medium can be produced to accomplish an accelerated movement of the abrading material.

Similar characters of reference are employed in all of the above-described views to indicate corresponding parts.

In the said drawings the reference character 1 indicates the mixing or commingling device embodying the principles of the present invention, the same comprising a suitable box, casing, pipe, or other receiver, into which the abrading material is fed and then forced under pressure from an air-blast or other forcing medium, such as steam, with accelerated motion directly upon the surface which is to be abraded, the accelerated abrading material being preferably forced from a reduced nozzle or discharge-opening connected with the device; but of course it will be understood that this may be varied, if desired.

In Figs. 1 and 2 I have represented the use of one form of mixing or commingling de-

vice 1 with a casing 2, forming a working or operating chamber or compartment. This chamber or compartment may be of any suitable construction, that illustrated in Fig. 1 of the drawings being arranged upon standards or supports 3 and being provided in one of its sides with an opening or openings 4 for the insertion of the hands and for properly manipulating the work within said chamber or compartment. The bottom of said compartment is preferably made in the shape of a funnel, the same being formed with an outlet 5, to which is attached a pipe or duct 6, having a valve 7, which may be used for regulating the flow or acceleration of the abrading material. The dome 8, which is preferably made in the manner of a removable cover, is provided with glass or other suitable windows 9 for the inspection of the work when under treatment of the sand-blast. Suitably arranged above and connected with an opening in the said dome is the above-mentioned mixing or commingling device for producing the accelerated flow or movement of the abrading material.

The preferred form of mixing or commingling device consists, essentially, of a suitable box or casing 10, having an opening in its lower side, the said opening being preferably provided with a screw-thread for the reception of a tube, pipe, or other suitable conveyer 11, provided with a nozzle or outlet 12. The lower end portion of this tube, pipe, or conveyer 11 is inserted in the opening of the dome 8 and is held in position by means of a flanged collar 13, secured to the dome by means of bolts or screws 14, and the said tube, pipe, or conveyer 11 is adjustably secured in position by means of a set-screw 15. It will be understood, however, that other fastening means may be substituted for the flanged collar and said bolts and set-screw, if desired. The said box or casing 10 is provided, preferably, in its upper surface with an inlet 16, to which is attached a flexible or other piece of tubing or piping 17. Suitably arranged within the tube, pipe, or conveyer 11 is a second pipe, tube, or conveyer 18, having a discharge nozzle or outlet 19, which terminates, preferably, at any desired distance above the nozzle or outlet 12 of the pipe, tube, or conveyer 11. The said pipe, tube, or conveyer 18 is also provided, preferably, with an elbow or turn 20, which is slipped through an opening 21 in the side of the box or casing 10, where it is held in place by means of a nut or union 22. Into this nut or union is also secured the screw-threaded end of a conveyer pipe or duct 23, these various parts forming a suitable injector, as will be clearly evident.

Referring now to Fig. 1 of the drawings, it will be seen that there is connected to the lower end of the pipe or duct 6 a fitting 24, preferably of the construction and for the pur-

poses stated in my previous application for Letters Patent, Serial No. 158,093. Connected with an outlet 25 of this fitting 24 is a pipe 26, which is in communication with the pipe 23 by means of a flexible or other piece of tubing or piping 27. The said fitting 24 is also made with another inlet, as 28, with which is connected a pipe or duct 29, which forms with the fitting 24 a suitable ejector, said pipe or duct 29 being provided with a regulating-valve 30. The reference character 31 indicates a suitable blower having a suitable inlet 32 connected therewith and an outlet 33. This outlet is preferably connected with a stand-pipe 34 or other suitable pipe or duct, which is usually provided with a four-way fitting 35, the respective openings of which are connected with a safety-valve 36, an air-chamber 37 for controlling and regulating the supply of air or other forcing medium, and an outlet or discharge pipe or duct 38. This pipe or duct 38 is suitably connected with the pipe or duct 29 and has a fitting 39, to which is attached another pipe or duct 40. Suitably connected with the pipe of tubing 17, arranged over the inlet 16 of the box or casing 10, is a pipe 41, in which there may be a valve 42 for regulating the force of the air or other forcing medium, and an elbow 43 connects said pipe 41 with the said pipe or duct 40, substantially as illustrated. Leading from the drum 8 of the chamber or compartment 2 is a dust-exhaust or back-pressure pipe 44 for the purpose of carrying off the dust from the said chamber or compartment 2 when the apparatus is in operation.

Having thus described one general arrangement and construction of the devices and parts of a sand-blast apparatus embodying the features and principles of my present invention, I will now set forth in detail the operation of the same for producing an accelerated motion of the abrading material.

Having placed a sufficient quantity of sand or other abrading material in the compartment or chamber 2, the regulating-valve 7 is opened and set to regulate the movement or acceleration of the abrading material. The regulating-valves 30 and 42 are also opened and suitably set and the blower 31 set in motion. Immediately air is forced through the respective pipes or ducts into the ejector or fitting 24 and also by means of the pipes or ducts 40, 41, and 17 into the box or casing 10 and thence into the pipe, tube, or conveyer 11 of the ejector. The sand or other abrading material at once passes from the compartment or chamber 2 through the pipe 6 and regulating-valve 7 into the fitting 24. The air or other forcing medium immediately causes the fitting 24 to act in the manner of an ejector, which takes up the abrading material and flows it through the pipes or ducts 26, 27, and 23 into the pipe, tube, or conveyer 18, from which the abrading material is discharged at

its nozzle 19 directly above the outlet or nozzle 12 of the pipe, tube, or conveyer 11. At this point the sand or other abrading material is thoroughly mixed with the air or other forcing medium, and with a regulated and constant pressure of such air or other forcing medium maintained back of the abrading material the motion of the latter is greatly accelerated and with great force passes from the outlet or nozzle 12 of the pipe, tube, or conveyer 11 and with great efficiency most effectively abrades the surface of an article or a piece of glass or metal which is manipulated in the chamber or compartment directly beneath the stream or jet of abrading material. Of course it will be understood that the mixing or commingling device 1 may also be used without the said chamber or compartment 2 and the said device 1 may be held in the hand, the nozzle or outlet 12 being manipulated directly above the work arranged upon a bench or other suitable portion of a room. In that case the abrading material is forced into and through the duct 27 from any suitable supply of abrading material with which said pipe or duct 27 may be connected. In that case also the pipe, tube, or conveyer 11 may be provided with a handle or lifting device 45, as represented in Fig. 3 of the drawings, or, if desired, the box or casing 10 may be provided with a handle 46, as illustrated in Fig. 4 of the drawings. The preferred form of accelerating device is that represented in said Figs. 2, 3, and 4 of the drawings, in which the pipes, tubes, or conveyers 11 and 18 are arranged one within the other, since by means of this arrangement the best results for producing an accelerated motion of the abrading material are obtained; but the arrangement of these parts may be varied, as indicated in Figs. 5 and 6 of the drawings, without departing from the scope of my present invention.

In Fig. 5 of the drawings I have represented a modified construction of mixing or accelerating device, the same comprising a box or casing 10, having an inlet 16 for the attachment thereto of the blast pipe or duct 17 and having connected with its open bottom a conveying pipe or tube 11, provided with the nozzle 12 in the manner previously set forth; but the said casing or box is made with an inlet 47, to which the pipe or duct 27 is attached for admitting the abrading material directly into the interior of the said box or casing 10 and forcing it under air or other pressure from the pipe or duct 17 into the pipe or tube 11, from which it is emitted under greatly-accelerated motion and force upon the article or body which is to be treated.

In lieu of the box or casing 10 any suitable pipe-fitting or other suitably-constructed connection, as 48, may be employed, as indicated in Fig. 6 of the drawings, the pipe or duct 11 being attached to one end of said fitting

and a nipple or pipe 49 being arranged in the opposite end of said fitting, to which the blast tube or duct 17 is attached for forcing the air-blast or other forcing medium into said fitting. The tube or pipe 27 is connected by means of a nipple or pipe 50 into an inlet 51 in the side or other suitable portion of the said fitting, as shown. By this means the abrading material is caused to enter the interior of said fitting and by means of the blast from the pipe or duct 17 is forced with accelerated movement into the pipe or duct 11 in the manner of my invention and as has been set forth in the above in connection with the description of the construction of the devices represented in the other figures of the drawings.

From the foregoing description of my invention it will be evident that I have devised a simply-constructed and efficiently-operating device for sand-blasting or the like, and I have provided a means for conveying an abrading material in which a complete mixture of the abrading material with a forcing medium is produced under greatly-accelerated motion of the said abrading material upon a body or surface, thereby producing the results long sought after in the art of sand-blasting or the like.

Of course I am aware that changes may be made in the general arrangements and combinations of the devices and their parts, as well as in the details of the construction thereof, without departing from the scope of this invention. Hence I do not limit my invention to the exact arrangements and combinations of the devices and their parts as described in the foregoing specification and as illustrated in the accompanying drawings; nor do I confine myself to the exact details of the construction of the said parts.

Having thus described my invention, what I claim is—

1. In a sand-blast apparatus, a forcing-medium-conducting means, means for conveying an abrading material having its point of delivery within said forcing-medium-conducting means near but above the point of delivery of said forcing-medium-conducting means, whereby the abrading material is delivered directly within the stream of the forcing medium for producing a mixture of the abrading material with the forcing medium to deliver the abrading material with accelerated motion upon a body or surface, and means for regulating the acceleration of the mixture of abrading material with the forcing medium, substantially as and for the purposes set forth.

2. In a sand-blast apparatus, an abrading-material-conveying tube provided with a nozzle, combined with a forcing-medium-conveying tube also provided with a nozzle, said forcing-medium-conveying tube having its nozzle arranged beneath the nozzle of said abrading-material-conveying tube, and all arranged

that the forcing medium will produce an accelerated movement of the abrading material, and means for regulating the acceleration of said material, substantially as and for the purposes
5 set forth.

3. In a sand-blast apparatus, an outer conveyer having a direct passage for a forcing medium therethrough, and a conveying-duct extending into said outer conveyer having its
10 point of delivery within said outer conveyer and near but above the point of delivery of said outer conveyer, all arranged that a forcing medium will produce an accelerated movement of the abrading material upon a body or sur-
15 face, and means for regulating the acceleration of said material, substantially as and for the purposes set forth.

4. In a sand-blast apparatus, an abrading-material-conveying tube, and a discharge-noz-
20 zle connected with said tube, combined with a forcing-medium-conveying tube concentric with said abrading-material-conveying tube, and a discharge-nozzle on said forcing-medium-conveying tube, said nozzles of said tubes be-
25 ing arranged one above the other, and a regulating means connected with said abrading-material-conveying tube for regulating the acceleration of the material through said tube, substantially as and for the purposes set forth.

5. In a sand-blast apparatus, the combina-
30 tion, with a casing having an inlet for admission of a forcing medium and an outlet, combined with an outer conveying-tube connected with said outlet and provided with a nozzle, and an abrading-material-conveying tube con-
35 nected with said casing and extending into said outer conveying-tube, substantially as and for the purposes set forth.

6. In a sand-blast apparatus, the combina-
40 tion, with a casing having an inlet for the admission of a forcing medium, and an outlet, combined with an outer conveying-tube connected with said outlet, and a nozzle on said tube, an abrading-material-conveying tube
45 connected with said casing and extending into said outer conveying-tube, and a nozzle connected with said inner tube, the nozzle of said outer tube being below the nozzle of said inner tube, substantially as and for the pur-
50 poses set forth.

7. In a sand-blast apparatus, the combina-
tion, with means for conveying an abrading material, of means connected therewith for
55 conducting a jet of air below the point of delivery of the abrading-material-conveying means and directly around and back of the jet of abrading material for forcing the abrading material with accelerated motion and force upon a body or surface and means for regu-
60 lating the acceleration of said material, substantially as and for the purposes set forth.

8. In a sand-blast apparatus, the combina-
tion, with a chamber in which the body to be
65 abraded is placed, the said chamber being provided with an inlet and an outlet, of an abrad-

ing-material-conveying means connected with said outlet, and means connected with the in-
let of said chamber for conducting a jet of air, and said abrading-material-conveying means having its point of delivery within said
70 air-conveying means near but above the point of delivery of said air-conveying means for forcing the air directly around and back of the jet of abrading material for producing a mixture of the abrading material and air under
75 pressure near the point of inlet of the said chamber for forcing the abrading material with accelerated force and motion into said chamber, substantially as and for the purposes set forth.
80

9. In a sand-blast apparatus, a pair of concentrically-arranged delivery-tubes, the inner tube being shorter than the outer tube and serving to deliver an abrading material, and the outer tube serving to deliver a forc-
85 ing medium directly to the delivery-opening of said inner tube and around and back of the delivered abrading material, whereby the movement of the abrading material is greatly accelerated and delivered under pressure upon
90 a body or surface, all combined with means for regulating the supply and the force of said forcing medium, and means for regulating the acceleration of the abrading material, substantially as and for the purposes set forth.
95

10. In a sand-blast apparatus, a receptacle for suitable abrading material, means for directing and controlling a forcing medium under pressure, means for ejecting the abrading material, means for accelerating the delivery
100 of said abrading material, and means for regulating the acceleration of said material, substantially as and for the purposes set forth.

11. A sand-blast apparatus, comprising, a receptacle for suitable abrading material, a
105 pipe passing from the lower portion of said receptacle, a pipe entering the receptacle at the upper portion, an ejector connected with the lower pipe, an injector connected with the upper pipe, a means of conveyance between
110 said ejector and said injector, and means for conducting regulatable supplies of forcing medium to said ejector and said injector, substantially as and for the purposes set forth.

12. A sand-blast apparatus, comprising, a
115 hopper for the abrading material provided with a regulated outlet, an ejector having a regulated air-supply, and an injector arranged to give force to the blast of abrading material, substantially as and for the purposes set
120 forth.

13. A sand-blast apparatus, comprising, a hopper for the abrading material provided with a regulated outlet, an ejector having a regulated air-supply, an injector, and regulat-
125 able means for forcing air under pressure to said injector to give force to the blast of abrading material, substantially as and for the purposes set forth.

14. In a sand-blast apparatus, the combina-
130

tion, of an ejector, with an injector comprised in the same pipe-circuit, said ejector being to raise the abrading material to the blast-nozzle, and said injector being to deliver the sand with force to the blast, substantially as and for the purposes set forth.

15. In a sand-blast apparatus, the combination, of an ejector, with an injector comprised in the same pipe-circuit, said ejector being to raise the abrading material to the blast-nozzle, and said injector being to deliver the sand with force to the blast, and a regulating means for regulating the delivery of the sand, substantially as and for the purposes set forth.

16. In a sand-blast apparatus, a hopper for the abrading material, a box or casing located outside of and above said hopper, means for conveying abrading material to said box, a means of communication between said box and hopper, means for producing a mixture of the abrading material with a forcing medium at a point above said hopper, to deliver, the abrading material with accelerated motion upon a body or surface, and means for regulating the acceleration of said abrading material, substantially as and for the purposes set forth.

17. In a sand-blast apparatus, an abrading-material-conveying tube provided with a nozzle, combined with a forcing-medium-conveying tube provided with a nozzle, the nozzle of the forcing-medium tube being below the nozzle of the abrading-material-conveying tube, so that the forcing medium will produce an accelerated movement of the abrading material, and means for regulating the acceleration of said abrading material, substantially as and for the purposes set forth.

18. In a sand-blast apparatus, an outer conveyer, and a conveying-duct extending into said outer conveyer, the nozzle of said outer conveyer being below the nozzle of said conveying-duct, so that a forcing medium will produce an accelerated movement of the abrading material upon a body or surface, and a regulating means for regulating the acceleration of said abrading material, substantially as and for the purposes set forth.

19. In a sand-blast apparatus, an abrading-material-conveying tube, and a discharge-nozzle connected with said tube, combined with a forcing-medium-conveying tube, and a discharge-nozzle on said forcing-medium-conveying tube, said nozzles of said tubes being arranged one above the other, and means for regulating the acceleration of the abrading material, substantially as and for the purposes set forth.

20. In a sand-blast apparatus, the combination, with a casing having an inlet for admission of a forcing medium, combined with an outer conveying-tube provided with a nozzle, an abrading-material-conveying tube connected with said casing and extending into

said outer conveying-tube, and means for regulating the acceleration of the abrading material, substantially as and for the purposes set forth.

21. In a sand-blast apparatus, the combination, with means for conveying an abrading material, of means connected therewith for conducting a jet of air directly around and back of the jet of abrading material for producing a mixture of air and abrading material and forcing the same with accelerated motion upon a body or surface, and means for regulating the acceleration of said mixture of air and abrading material, substantially as and for the purposes set forth.

22. A sand-blast device comprising a receptacle for suitable abrasive material in bulk, means for directing and controlling air under pressure, means for ejecting the air and moving regulatable quantities of abrasive material, means for accelerating the delivery of said material, and means for regulating the acceleration.

23. A sand-blast device, comprising a receptacle for suitable abrasive material in bulk, provided with a lid and hand-holes for introducing the work into the receptacle and providing for the same being held, means for directing and controlling air under pressure, means for ejecting the air and moving regulatable quantities of abrasive material, means for accelerating the delivery of said material, and means for regulating the acceleration.

24. A sand-blast device comprising a receptacle, a suitable supporting-frame therefor, a lid secured to the receptacle, a pipe passing from the receptacle at the lower end, a pipe entering the receptacle at the upper end, an ejector connected to the lower pipe, and an injector connected to the upper pipe, a pipe connecting the ejector and injector, and means for supplying regulatable quantities of air to the ejector and injector.

25. A sand-blast device, comprising a receptacle, a suitable supporting-frame therefor, a lid secured to the receptacle, a pipe passing from the receptacle at the lower end, a pipe entering the receptacle at the upper end, an ejector connected to the lower pipe and an injector connected to the upper pipe, a pipe connecting the ejector and injector, a pipe and gate or cock connected to the ejector, a gate or cock and pipe connected to the injector, and a T-coupling at the union of said parts by which air under pressure is admitted to the ejector and injector and regulated by the pleasure of the operator.

In testimony that I claim the invention set forth above I have hereunto set my hand this 28th day of October, 1903.

WILLIS R. KING.

Witnesses:

FREDK. C. FRAENTZEL,
GEO. D. RICHARDS.